UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/800,493	03/15/2004	Stephen Fife Sheldon	11466	9307

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John D. Cowart	SANDERS, AARON J

ART UNIT	PAPER NUMBER
2191	

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Please find below and/or attached an Office communication concerning this application or proceeding.

	Application No.	Applicant(s)
Office Action Summary	10/800,493	SHELDON ET AL.
	Examiner	**Art Unit**	
	Aaron J. Sanders	2191	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 March 2004*.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-42* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *15 March 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

Claim Objections

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1, 5, 7, 15, 19, 21, 29, 33, and 35 are objected to under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contain subject matter that was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

As per claims 1, 15, and 29, there is no description of what 'resolving columns' is that would enable the claims.

As per claims 5, 19, and 33, there is no description of what an 'inner table of an outer join' is that would enable the claims.

As per claims 7, 21, and 35, there is no description of what an 'assignment list clause' is that would enable the claims.

Claim 2 is objected to for the following informality: after 'F(C) returns the return value', the expression is reduced 'to a return value' instead of 'the return value' previously mentioned. For purposes of examination, the claim is interpreted to read, 'then reducing the expression to the return value'.

Claim 16 is objected to for the following informality: claim 16 depends on itself. For purposes of examination, claim 16 will be interpreted to depend on claim 15. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an

international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-3, 6-9, 11-17, 20-23, 25-31, 34-37, and 39-42 are rejected under 35 U.S.C. 102(e) as being anticipated by Paulley et al., U.S. Pat. 6,665,664.

Paulley et al. disclose a method, computer program, and system, but only Applicant's method claims 1-3, 6-9, and 11-14 are reproduced here, as they are exemplary of Applicant's computer program claims 15-17, 20-23, and 25-28 and system claims 29-31, 34-37, and 39-42.

As per claims 1-3, 6-9, and 11-14, Paulley et al. teach:

1. A method of processing a database query, the query including one or more expressions, the method including:

resolving columns in one or more of the expressions (See e.g. Brief Summary par. 29, 'Socher's minimization method uses a matrix as its basic data structure with the rows of the matrix representing unique literals and the columns representing the particular conjunct (or disjunct) in which the literals appear');

performing expression optimization on one or more of the expressions (See e.g. Brief Summary par. 31, 'a preprocessing phase, in which expressions are simplified whenever possible');

performing further query optimization (See e.g. Brief Summary par. 31, 'a normalization phase, in which the simplified expression is analyzed and either fully converted to conjunctive normal form'); and

where the expression optimization is performed before further query optimization (See e.g. Brief Summary par. 31, 'This preprocessing phase includes several steps that are designed to simplify the original query expression, thereby simplifying the matrix processing occurring in the normalization phase').

2. The method of claim 1, where each expression includes one or more sub-expressions, and where the expression optimization includes, for each expression:

(1) if the expression has a form selected from the group consisting of "SE+0," "SE*1," and "SE/1," where SE is a sub-expression, then reducing the expression to SE;

(2) if the expression has a form selected from the group consisting of "SE*0," "0/SE," and "0 MOD SE," where SE is a non-nullable sub-expression, then reducing the expression to 0; and

(3) if the expression is of the form F(C), where F is a function and C is a constant and F(C) returns the return value, then reducing the expression to a return value (See e.g. Detailed Description par. 40, 'simplifies the expression by eliminating tautologies (statements that are always true) and simplifying predicates and operator conditions as follows: (a) Folding constant expressions when the expressions contain integers (e.g., x=3+4 is changed to x=7) and the columns referenced in the statement are numeric' where 'SE+0,' 'SE*1,' 'SE/1,' 'SE*0,' '0/SE,' and '0 MOD SE' are tautologies and 'x=3+4' is a function in the form 'F(C)').

3. The method of claim 2, where one or more of the sub-expressions include sub-expressions, the method including;

(4) for each sub-expression that includes a sub-expression, simplifying the sub-expression using (1)-(3) (See e.g. Detailed Description par. 31, 'The present invention repeatedly generates prime implicates of disjunctive sub-expressions nested within a conjunctive expression, thereby normalizing the search condition piece-by-piece').

6. The method of claim 1, where the query is represented by a tree, including one or more nodes (See e.g. Detailed Description par. 20, 'the SQL statements are passed to the parser 361 which converts the statements into a query tree').

7. The method of claim 1, where the query includes an assignment list clause and where one or more of the expressions are in the assignment list clause (See e.g. Detailed Description par. 74, 'A linked list of pointers is used to track which branches in the expression tree should be converted').

8. The method of claim 1, where the query includes a WHERE clause, and where one or more of the expressions are in the WHERE clause (See e.g. Brief Summary Table 1, 'SELECT name FROM employees WHERE sal=10,000').

9. The method of claim 1, where further query optimization includes:
determining a satisfiability of the database query (See e.g. Brief Summary par. 14, 'Conjunctive conditions are useful because they must each evaluate to true in order for the query's Where clause to be satisfied').

11. The method of claim 1, where further query optimization includes:
determining one or more plans for executing the query (See e.g. Brief Summary par. 13, 'a component called the optimizer determines the "plan" or the best method of accessing the data to implement the SQL query').

12. The method of claim 11, where one of the one or more plans includes:
scanning a table to locate rows that satisfy one or more conditions; and
summing one or more columns in the rows that satisfy the one or more conditions (See e.g. Brief Summary par. 20, 'The usefulness of converting the search conditions to conjunctive normal form is that for a clause that consists of only a single predicate (i.e., not "ORed with anything"), for any row in the result of that query that predicate must be true' where then summing the columns would have the same 'true' result).

13. The method of claim 1, where further query optimization includes:
selecting an optimal plan from executing the database query (See e.g. Detailed Description par. 22, 'The optimizer, therefore, performs an analysis of the query and picks the best execution plan, which in turn results in particular ones of the access methods being invoked during query execution').

14. The method of claim 1, where further query optimization includes two or more optimizations selected from the group consisting of:

determining a satisfiability of the database query (See e.g. Brief Summary par. 14, 'Conjunctive conditions are useful because they must each evaluate to true in order for the query's Where clause to be satisfied');

determining a transitive closure of the database query;

determining one or more plans for executing the query (See e.g. Brief Summary par. 13, 'a component called the optimizer determines the "plan" or the best method of accessing the data to implement the SQL query'); and

selecting an optimal plan from executing the database query (See e.g. Detailed Description par. 22, 'The optimizer, therefore, performs an analysis of the query and picks the best execution plan, which in turn results in particular ones of the access methods being invoked during query execution').

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4, 18, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paulley et al. as applied to claims 1-3, 6-9, 11-17, 20-23, 25-31, 34-37, and 39-42 above, and further in view of Leung et al., U.S. Pat. 5,590,324.

Leung et al. discloses a method, computer program, and system, but only Applicant's method claim 4 is reproduced here, as they are exemplary of Applicant's computer program claim 18 and system claim 32.

4. The method of claim 2, where SE is nullable if it includes a nullable column (See e.g. Detailed Description par. 51, 'if a head expression simply consists of a column C, then the output column retains the nullability of column C from its input derived table or base table').

Paulley et al. do not disclose making a sub-expression nullable if it includes a nullable column, but Leun et al. do make such a disclosure. Paulley et al. and Leung et al. are analogous art because they both deal with optimizing SQL queries. At the time of the invention, it would have been obvious to one of ordinary skill in the art to make sub-expressions nullable if they include a nullable column. The motivation for combining these features is disclosed by Leung et al. Brief Summary par. 14, 'The exploitation of column nullability can mean a potentially huge saving in query execution time'.

Claims 5, 19, and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paulley et al. as applied to claims 1-3, 6-9, 11-17, 20-23, 25-31, 34-37, and 39-42 above, and further in view of Andrei, U.S. Pat. 6,618,719.

Andrei discloses a method, computer program, and system, but only Applicant's method claim 5 is reproduced here, as they are exemplary of Applicant's computer program claim 19 and system claim 33.

5. The method of claim 2, where SE is nullable if it belongs to an inner table of an outer join (See e.g. Detailed Description par. 150, 'The ASE query engine's single outer join algorithm requires the inner table of the outer join to be also the inner table of the join, to substitute NULLs when no inner row qualifies for a given outer row' where Brief Summary par. 12, 'ASE' is an 'Adaptive Server Enterprise' and rows are part of a 'derived table--A table implemented as a stream of rows, representing the result of a relational operator').

Paulley et al. do not disclose making a sub-expression nullable if it belongs to an inner table of an outer join, but Andrei does make such a disclosure. Paulley et al. and Andrei are analogous art because they both deal with optimizing SQL queries. At the time of the invention, it would have been obvious to one of ordinary skill in the art to make a sub-expression nullable if it belongs to an inner table of an outer join. The motivation for combining these features is disclosed by Leung et al., U.S. Pat. 5,590,324, Brief Summary par. 14, 'The exploitation of column nullability can mean a potentially huge saving in query execution time'.

Claims 10, 14, 24, 28, 38, and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Paulley et al. as applied to claims 1-3, 6-9, 11-17, 20-23, 25-31, 34-37, and 39-42 above, and further in view of Esko Nuutila, *Transitive Closure*, Helsinki University of Technology, 9 October 1995.

Nuutila can apply to a method, computer program, and system, but only Applicant's method claims 10 and 14 are reproduced here, as they are exemplary of Applicant's computer program claims 24 and 28 and system claims 38 and 42.

10. The method of claim 1, where further query optimization includes:
determining a transitive closure of the database query.

14. The method of claim 1, where further query optimization includes two or more optimizations selected from the group consisting of:
determining a satisfiability of the database query (See e.g. Paulley et al. Brief Summary par. 14, 'Conjunctive conditions are useful because they must each evaluate to true in order for the query's Where clause to be satisfied');
determining a transitive closure of the database query;
determining one or more plans for executing the query (See e.g. Paulley et al. Brief Summary par. 13, 'a component called the optimizer determines the "plan" or the best method of accessing the data to implement the SQL query'); and
selecting an optimal plan from executing the database query (See e.g. Detailed Description par. 22, 'The optimizer, therefore, performs an analysis of the query and picks the

best execution plan, which in turn results in particular ones of the access methods being invoked during query execution').

Paulley et al. do not disclose 'determining a transitive closure of the database query', but Nuutila does make such a disclosure ('The transitive closure of G is a graph G+ = (V,E+) such that for all v,w in V there is an edge (v,w) in E+ if and only if there is a non-null path from v to w in G'). Paulley et al. and Nuutila are analogous art because they both deal with parsing database queries. At the time of the invention, it would have been obvious to one of ordinary skill in the art to determine a transitive closure of the database query. The motivation for combining these features is disclosed by Nuutila, 'It is required, for instance, in the reachability analysis of transition networks representing distributed and parallel systems and in the construction of parsing automata in compiler construction'.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Aaron J. Sanders whose telephone number is 571-270-1016. The examiner can normally be reached on M-Th 7:30a-5:00p.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Bruce can be reached on 571-272-2487. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

AJS

DAVID BRUCE
SUPERVISORY PATENT EXAMINER